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Poultry Management in a Subtropical, Semiarid Climate

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Agricultural Research Service
UNITED STATES DEPARTMENT OF AGRICULTURE

CONTENTS

| | Page |
|--|------|
| Choosing a breed..... | 1 |
| Market preferences..... | 1 |
| Effect of weather on different breeds..... | 2 |
| Selecting replacement stock..... | 2 |
| When to start chicks..... | 2 |
| Brooding..... | 3 |
| Brooder house..... | 3 |
| Tents for brooding chicks..... | 4 |
| Range for young chickens..... | 5 |
| Feeding chicks..... | 5 |
| Rearing the young flock..... | 7 |
| Summer shelters for growing stock..... | 7 |
| Houseless method for growing stock..... | 7 |
| Houses for mature stock..... | 7 |
| Cages for layers..... | 9 |
| Use of corrugated metal for roofs..... | 9 |
| Houseless method for layers..... | 9 |
| Advantages..... | 9 |
| Disadvantages..... | 10 |
| Limitations in adaptability..... | 11 |
| Feeding for egg production..... | 11 |
| Scratch grain..... | 11 |
| Water..... | 12 |
| Care of market eggs..... | 12 |
| Disease prevention..... | 13 |
| Parasites in the Southwest..... | 13 |
| Fowl ticks..... | 14 |
| Sticktight fleas..... | 14 |

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Poultry Management in a Subtropical, Semiarid Climate



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A subtropical, semiarid climate is found in parts of southern Arizona, southern California, and southwestern Texas. This report emphasizes certain features of poultry management in such a climate. It is based largely on experimental studies and observations in the Salt River Valley, near Phoenix, Ariz., where winters are mild, summers are hot, sunshine is abundant, relative humidity is low, and average annual precipitation is light. A considerable difference between day and night temperatures is also common, the range sometimes being 40° F.

Velocity of wind, a variable feature among areas where the climate is otherwise similar, may be the limiting factor in the successful use of a tent for brooding chicks or the houseless system for mature flocks as described in this report. The average wind velocity at Phoenix is low, and the winds are not violent at their extremes.

CHOOSING A BREED

The choice of breed or strain is a matter of personal preference influenced by whether the interest is in producing market eggs or poultry meat. White Leghorns and Leghorn-type strains and crosses are usually the most efficient producers of market eggs. When profits must come largely from the sale of poultry meat, broiler crosses bred especially for efficient meat production should be used.

General-purpose breeds, such as the New Hampshire, Rhode Island Red, or Plymouth Rock, are usually found on farms where poultry keeping is a minor enterprise and the farmer wants both eggs and poultry meat for his own table.

Market Preferences

The desires of the local market for poultry products should be considered when a breed is chosen. Eggs with white shells bring a premium on most markets, but eggs with brown shells bring the highest price on others. On some markets, such as Phoenix, Ariz., a higher price per pound is often paid for meat chickens with colored feathers, although a premium is paid for white-shelled eggs. New Hampshires, Rhode Island Reds, or Plymouth Rocks usually bring in greater returns than White Leghorns when they are sold for meat, but the eggs from a general-purpose flock may bring less than Leghorn eggs because of shell color.

Effect of Weather on Different Breeds

Heat prostration among laying chickens is often of considerable importance where summer temperatures are high. The inexperienced poultryman frequently wonders whether deaths from heat are more numerous in general-purpose breeds, such as the New Hampshire, than in lighter breeds, such as the Leghorn. If chickens have ample shade and drinking water there apparently is no difference between breeds, providing the general-purpose breeds are not overly fat during hot weather. Restricting the scratch grain or feeding an all-mash diet will help to avoid overly fat birds. The flock should be culled before hot weather to remove nonlayers, which sometimes become very fat.

SELECTING REPLACEMENT STOCK

Nearly all replacement stock is obtained by purchasing baby chicks from commercial hatcheries. Practically all of them are sexed pullet chicks, since there is seldom a satisfactory market for egg-production cockerels grown out for meat. The problem of selecting a strain that meets the requirements of the individual poultryman has been simplified greatly with the advent of random sample tests. These tests provide information on all the important economic traits of poultry. There are many of these tests in existence. With the publication of "Report of Egg Production Tests,"¹ a complete summary of all the tests is available to poultrymen to provide them with the best evaluation of all the stocks entered. Differences between the top ranked stocks are small. It is possible that some stocks are better adapted than others to a subtropical, semiarid climate, although this has not been proved. Each poultryman is advised to test under his own conditions several of the stocks that seem from the summary to be most suitable for his requirements.

When To Start Chicks

If pullets are to lay well when egg prices are highest, they must be hatched in definite seasons of the year. Most of the lighter breeds, such as Leghorns, and some of the general-purpose breeds begin producing eggs when they are from 5 to 6 months old. Most of the general-purpose breeds begin to lay a month or two later.

Chickens mature more slowly in regions where summer temperatures are high than in other regions. This difference in rate of maturity is probably due to the fact that consumption of feed, which is necessary for growth, decreases as the air temperature rises; at least this is true within reasonable limits. The poultryman in a region of high summer temperatures must consider the effect of the temperature on the growth of his chickens in deciding when to hatch or buy baby chicks.

Chicks hatched just before or during the high-temperature period are likely to develop too slowly to make profitable laying stock and probably will be undersized when they mature. Chicks hatched too early in the year may mature at a normal rate, lay for a month or two,

¹ U.S. ANIMAL HUSBANDRY RESEARCH DIVISION. REPORT OF EGG PRODUCTION TESTS. ARS 44-79-2, 78 pp. 1961.

and then molt with an accompanying loss of several weeks of egg production.

Under subtropical, semiarid climatic conditions, from the first of February to the first of April is the best time to hatch the general-purpose breeds when they are to be raised for egg production. March is the best month in which to hatch the lightweight breeds, such as Leghorns, although many poultrymen get good results with chicks hatched in other months. Fall-hatched chicks are not so desirable.

The growth rate of young chickens may be improved during the high-temperature period in several ways: (1) Their houses may be artificially lighted either all night or from midnight to daylight only; (2) their houses may be cooled with a cooler of the evaporative type; and (3) they may be permitted to eat only during the cooler hours by closing their feed hoppers during the day and opening them at night; with this method they would need artificial light.

Although any of these methods will stimulate growth of young chickens, they will not grow as fast as during the cooler months.

BROODING

The canopy-type brooder is most commonly used. It consists mainly of a circular hover and some source of heat. According to price and availability, the source of heat may be natural or artificial gas, coal, oil, or electricity.

Electric brooders are popular in the subtropical areas of the Southwest where electricity is dependable and cheap. Oil-heated brooders are probably next in popularity. Coal-burning brooders are not used because of the rather high price of coal and the difficulty of regulating the fire to take care of the difference between day and night temperatures. The recommendations of the manufacturer should be followed in operating the brooder.

If straight run chicks are purchased, about 50 percent will be pullets. Until your own experience demonstrates conditions that make your needs different, it is well to start about 10 to 15 percent more pullet chicks than you need to house at sexual maturity. This will allow for rearing mortality and culling at housing time.

For best results not more than 300 chicks should be brooded in one group, and approximately 7 square inches of hover space should be allowed per chick. A circular hover 52 inches in diameter will provide the 2,100 square inches of hover space needed for 300 chicks.

Brooder House

One square foot of floor space should be allowed in the brooder for each 2 chicks during the first 6 weeks, or about 150 square feet for 300 chicks. Between 6 and 10 weeks, chicks should have 1 square foot of floor space per bird, unless they have access to additional space outside the brooder house, and after 10 weeks, they should have 2 square feet.

A brooder house suitable for mild climates is shown in figure 1. It should have a concrete or wood floor. The wood shutters that form part of the sides and rear of the house are closed on cold nights and days. Canvas-covered frames fit in the front opening for use



FIGURE 1.—Type of house suitable for brooding chicks in mild climates. BN-19437

during cool periods. In warm weather the frames are removed and the shutters are opened for ventilation.

Tents for Brooding Chicks

Tents can be used for brooding chicks except during hot weather in areas where the climate is similar to that in the Salt River Valley. The method may be successful in other areas during periods when rainfall is slight, wind velocity is not great, and air temperatures are not excessively high. The main advantage of a tent brooder is its relatively low cost as compared with the conventional brooder house.

A tent for brooding chicks should have a wood floor. Boards 1 inch thick and 12 inches wide should be nailed on edge on top of the floor, around its outer edge. The bottom of the tent walls should be fastened to the top of the boards. This helps prevent floor drafts and eliminates the rotting of the bottom of the tent caused by fastening it to the ground with pegs.

On cold nights in the early part of the brooding period, a circle of roofing paper should be placed about 4 feet from the outer edge of the brooder. This practice is recommended when an electric brooder is used without supplementary heat during cool weather, as it helps conserve the heat underneath the hover. The circle must be placed far enough from the outer edge of the hover so the chicks can move away from the heat if they get too hot.

The sides of the tent can be rolled up to provide additional ventilation when the tent gets too warm on the inside.

To keep the tent from blowing down during windstorms, it may be supported by stretching it over a skeleton framework of lumber built on the same outline as the tent. Also, the tent may be anchored to small posts set in the ground on each side. The posts should be set



FIGURE 2.—Brooding chicks in tents. Note the method of anchoring the tents.

3 or 4 feet out from the corners and sides of the tent, should extend at least 3 feet above ground level, and should slope slightly away from the tent. A 2-by-4 12 feet long may be nailed to the posts and the tent ropes fastened to it. The upright poles may be fastened with ropes to posts set in the ground several feet away from the front and rear of the tent. The tents shown in figure 2 are supported in this manner.

The openings near the tops of the two rear tents in figure 2 provide ventilation when the front flaps are closed. These openings are about 10 inches square and are covered with open-mesh cloth.

If rats menace the chicks, protection may be obtained by boarding up the sides of the tents 2 feet or more from the floor. The best protection against rats is to eliminate them before the brooding season by using a good rodenticide, such as Warfarin.

Caution: Warfarin is dangerous to pets and children and should be kept from them.

Where a tent brooder has a stovepipe as part of the heating equipment, asbestos should be placed around the tent opening through which the stovepipe passes to protect against fire. A spark arrester placed in the stovepipe will lessen the fire hazard.

RANGE FOR YOUNG CHICKENS

Where fields are irrigated, it is not advisable to allow chickens to range on young growing grass or legumes because irrigation water may carry disease organisms. A good practice on irrigated farms is to confine the chickens in houses. If the poultryman wants to give his chickens fresh green feed, he can cut and feed it to them. Some saving may result from feeding fresh green feed, but it is not necessary for proper nutrition as practically all poultry mashes contain alfalfa meal or alfalfa leaf meal.

FEEDING CHICKS

Starting mash should be available to the chicks at all times as soon as they are placed under the brooder. For the first day or two, it is

a good plan to put some of the mash on pieces of cardboard as well as in hoppers.

Chicks may be fed an all-mash starting ration in either pelleted or unpelleted form until they are from 8 to 12 weeks old and then an all-mash growing ration in either form until about 2 or 3 weeks before egg production is expected to begin, or they may be fed a mash-grain ration.

In the mash-grain method, the chicks are usually started on mash. Beginning at 3 or 4 weeks of age, they are fed as much grain as they will clean up in around 30 minutes. The quantity of grain is gradually increased until they are eating about equal parts of grain and mash when they are 10 or 12 weeks old. After that some poultrymen keep grain in hoppers and let the chickens eat all they want.

Following are examples of rations that could be fed to chicks in subtropical, semiarid areas where sorghum grains are raised but yellow corn is not:

| <i>Ingredient</i> | <i>ALL-MASH CHICK-STARTING RATION</i> | <i>Proportion of ration (percent)</i> |
|--|---------------------------------------|---------------------------------------|
| Ground milo or begari | ----- | 51.25 |
| Ground wheat or barley | ----- | 10 |
| Wheat bran | ----- | 10 |
| Alfalfa leaf meal | ----- | 5 |
| Meat scraps | ----- | 5 |
| Soybean meal | ----- | 7 |
| Cottonseed meal | ----- | 7 |
| Fish meal | ----- | 3 |
| Riboflavin supplement (500 micrograms of riboflavin per gram) | ----- | .15 |
| Ground limestone | ----- | 1 |
| Manganized salt | ----- | .5 |
| Vitamin A and D feeding oil (2,000 International Units of vitamin A; 400 International Units of vitamin D) | ----- | .1 |

| <i>Ingredient</i> | <i>ALL-MASH CHICK-GROWING RATION</i> | |
|--|--------------------------------------|------|
| Ground milo or begari | ----- | 58.8 |
| Ground wheat or barley | ----- | 10 |
| Wheat bran | ----- | 10 |
| Alfalfa leaf meal | ----- | 5 |
| Meat scraps | ----- | 5 |
| Soybean meal | ----- | 3 |
| Cottonseed meal | ----- | 6 |
| Riboflavin supplement (500 micrograms of riboflavin per gram) | ----- | .1 |
| Ground limestone | ----- | 1.5 |
| Manganized salt | ----- | .5 |
| Vitamin A and D feeding oil (2,000 International Units of vitamin A; 400 International Units of vitamin D) | ----- | .1 |

| <i>Ingredient</i> | <i>CHICK-GROWING MASH TO BE FED WITH GRAIN</i> | |
|--|--|------|
| Ground milo or begari | ----- | 37.6 |
| Ground wheat or barley | ----- | 10 |
| Wheat bran | ----- | 10 |
| Alfalfa leaf meal | ----- | 5 |
| Meat scraps | ----- | 9 |
| Soybean meal | ----- | 12 |
| Cottonseed meal | ----- | 12 |
| Riboflavin supplement (500 micrograms of riboflavin per gram) | ----- | .2 |
| Ground limestone | ----- | .5 |
| Steamed bonemeal | ----- | 2.5 |
| Manganized salt | ----- | 1 |
| Vitamin A and D feeding oil (2,000 International Units of vitamin A; 400 International Units of vitamin D) | ----- | .2 |

Locally grown grains may be used in the scratch mixture. A good scratch mixture may be made from equal parts of milo or hegari and wheat.

Some poultrymen prefer to feed the same mash during both the brooding and rearing periods, not changing until the pullets are fed laying mash. In this system, the proportion of scratch grain can be increased as the birds get older. The simplest method is to feed the grain free choice.

REARING THE YOUNG FLOCK

The length of the brooding period will depend on the weather, but during the spring months in subtropical climates heat often is discontinued less than 6 weeks after starting the brooder. The chicks should be roosting before the brooder heat is discontinued.

Chicks of different ages should not be brooded or reared together. Also, it is a good plan to separate the pullets from the cockerels as soon as sex can be determined. Separation of the sexes in the lighter breeds should be made before they are 6 weeks old. With the heavier breeds, the separation of sexes can be delayed for 2 or 3 weeks longer.

Summer Shelters for Growing Stock

If growing chickens are allowed to range, either the "houseless method" or a "range shelter" may be used. The range shelters most commonly used are simple structures similar to, but smaller than, the houses in figures 3 and 4. The brooder house may be used as a shelter, but a tent is too hot to use during the summer months.

When the confinement method is used in raising young stock in mild climates, "open-type" houses (figs. 3 and 4) are excellent.

Houseless Method for Growing Stock

Where rainfall is slight and temperatures are high, as in the Salt River Valley, growing stock may roost outside after the brooding period. This method, known as the houseless method, should be used for young chickens after the brooding period if it is to be used for them as mature birds. In this method all equipment other than roosts and dropping boards is placed under natural or artificial shade; the roosts are placed above dropping boards nearby in the yard but without shelter. The roosts should be high enough to keep predatory animals, such as coyotes, from the chickens. If necessary, poultry netting can be placed around and above the roosts as a protection against owls.

HOUSES FOR MATURE STOCK

As the main function of a poultry house is to provide comfort, the type of house to use for mature stock depends largely on climatic conditions. The house should have a concrete or wood floor.

Houses similar to those in figures 3 and 4 are satisfactory for year-round use in a semiarid, subtropical climate. Some poultrymen cover three sides of the house with burlap or canvas in the colder winter months, whereas others leave the sides open. Palm leaves or other suitable materials should be placed on the framework to the

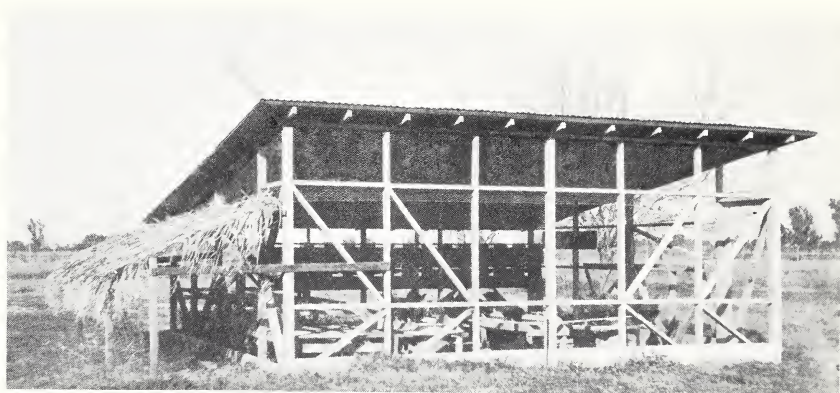


FIGURE 3.—Shed-roof houses adapted for mild climate.

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FIGURE 4.—A good gable-roof house for laying stock in mild climates. The house is 20 feet square at the base, 8 feet high in the front and rear, and 10 feet high in the center.

left of the house in figure 4 to shade the floor on hot summer afternoons.

Contrary to popular opinion a number of years ago, it is feasible in subtropical climates to confine the layers to a house throughout the year. The confinement method requires less land than the range method. Also, with the confinement method infestation by some parasites, such as roundworms, is more easily controlled.

When mature chickens are confined in a house, from $3\frac{1}{2}$ to 4 square feet of floor space per bird gives the highest rate of egg production, although many poultrymen find that from 2 to $2\frac{1}{2}$ square feet per bird yields the highest economic return. When they range outside during the entire year, 2 square feet of floor space per bird in the house is enough. The house should have a concrete or wood floor.

Some poultrymen cool the house during hot weather by sprinkling the roof with either stationary or revolving sprinklers. Roof sprin-

klings requires considerable water and has several other disadvantages. Cooling the birds by spraying them with a fine mist from "foggers" placed inside their house is becoming popular and is more effective than roof sprinkling. Care must be taken to be sure the litter does not become excessively wet.

Cages for Layers

Several commercial poultrymen in the Salt River Valley use the cage method for layers. The cage method has both advantages and disadvantages as compared with either the confinement or the houseless method. The prospective poultryman should give considerable thought to all three methods before he chooses one.

Use of Corrugated Metal for Roofs

When shingles are costly and roofing paper must be replaced often, corrugated metal (either aluminum or galvanized iron) may be used to roof poultry houses or to provide artificial shade.

The poultry house with a corrugated metal roof may be kept as cool in summer as if it had a shingle or roofing-paper roof, even where summers are hot. However, the space between the roof and the floor must be well ventilated, as shown in the houses in figures 3 and 4. When corrugated metal is used, the top side of the roof should be painted white to reduce the amount of heat transmitted to the birds.

Corrugated-metal roofs that are not laid on tight sheathing have one peculiarity that may make them unsuitable for use where the climate is colder than in the Salt River Valley. Moisture collects on the bottom side of the metal when there is a frost and drops down onto the litter. This is not a serious fault where there are relatively few frosts and the morning sun shines into the houses practically every day in the winter and dries out the litter.

HOUSELESS METHOD FOR LAYERS

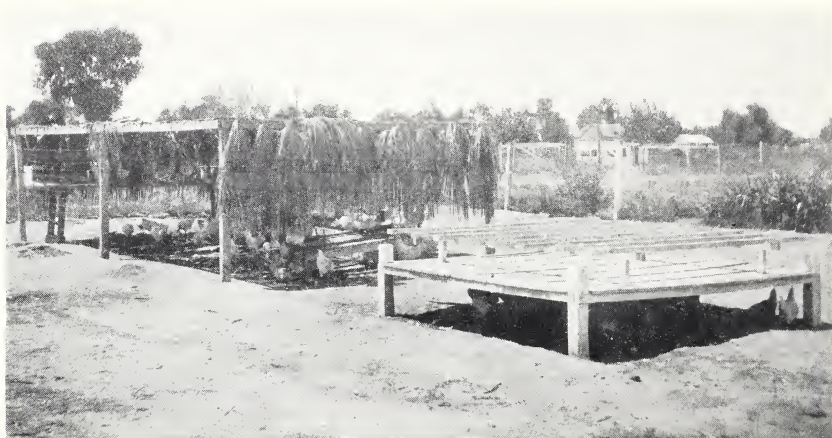
The houseless method (as described on p. 7) may be used for laying chickens throughout the year in the Salt River Valley if it was used for them after the brooding period. The laying flock should have the same protection against predatory animals as recommended for growing stock.

One type of protection for equipment other than roosts is shown in figure 5. Another type, with corrugated metal furnishing the protection, is shown in figure 6.

Growing stock that did not roost in the open after the brooding stage should not roost in the open after they mature. If chickens that have been roosting in a house are forced to roost outside during rainy or unfavorable weather, they may develop colds, roup, and other sickness.

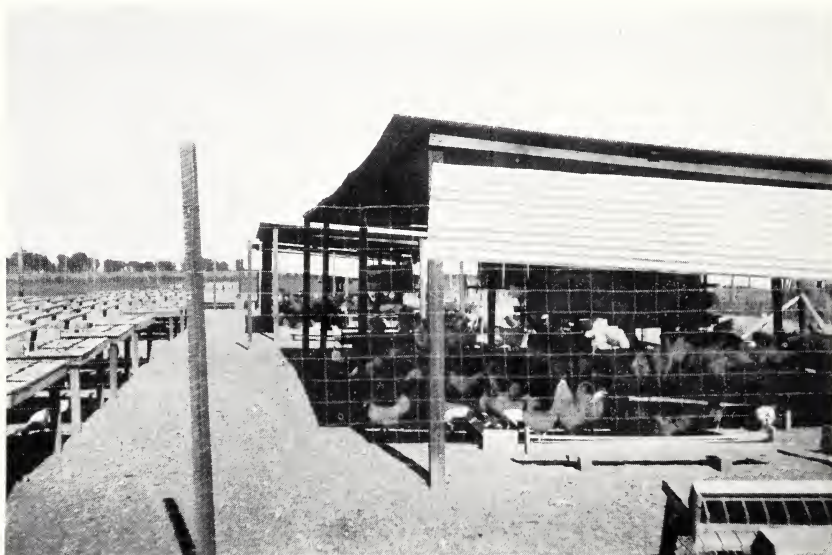
Advantages

The chief advantage of the houseless method is its low cost. With this method, a person can start in the poultry business without the initial expense of providing houses for the layers and breeders, and he can retire without losing the money invested in such buildings.



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FIGURE 5.—Houseless method with equipment, other than roosts, protected by palm leaves.



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FIGURE 6.—Houseless method with equipment, other than roosts, protected by corrugated metal.

Roosting platforms may be moved more easily than houses, which simplifies the system of land rotation. Where fowl ticks, commonly known as blue bugs, are prevalent, this method is a distinct advantage in their control or eradication.

Disadvantages

The disadvantages of the houseless method are those common to any range system. One of the main disadvantages of using the range

system without a house rather than with a house is that an increased number of dirty eggs may be obtained during rainy weather. This can be remedied by providing a concrete or wood floor under the artificial shade and confining the fowls when necessary.

Limitations in Adaptability

The houseless method for mature stock is probably limited to regions where very cold weather and heavy rainfall are uncommon or unknown. In some places it is necessary to use windbreaks for protection. The windbreaks may consist of a row of trees, such as tamarisk, planted close together, or a solid board fence.

FEEDING FOR EGG PRODUCTION

Laying mash should be kept in hoppers before the layers at all times. Either an all-mash or a mash-grain ration may be fed, and it may be in either pelleted or unpelleted form. Some poultrymen give their birds a supplemental feeding of pellets once a day when a pelleted all-mash ration is not fed regularly. Layers fed a mash-grain ration should have access to grit and limestone or oystershell in hoppers, and some poultrymen who feed an all-mash ration also follow this practice.

Following are examples of rations that will support good egg production:

| <i>Ingredient</i> | ALL-MASH LAYING RATION | <i>Proportion of ration (percent)</i> |
|---|------------------------|---|
| Ground milo or hegari | ----- | 56 |
| Ground wheat or barley | ----- | 10 |
| Wheat bran | ----- | 10 |
| Alfalfa leaf meal | ----- | 5 |
| Meat scraps | ----- | 5 |
| Soybean meal | ----- | 6 |
| Fish meal | ----- | 3 |
| Ground limestone | ----- | 4 |
| Manganized salt | ----- | .5 |
| Riboflavin supplement (500 micrograms of riboflavin per gram) | ----- | .25 |
| Vitamin A and D feeding oil (2,000 International Units of vitamin A ; 300 International Units of vitamin D) | ----- | .25 |

LAYING MASH TO FEED WITH GRAIN ¹

| | | |
|---|-------|----|
| Ground milo or hegari | ----- | 41 |
| Ground wheat or barley | ----- | 10 |
| Wheat bran | ----- | 10 |
| Alfalfa leaf meal | ----- | 5 |
| Meat scraps | ----- | 10 |
| Soybean meal | ----- | 12 |
| Fish meal | ----- | 6 |
| Ground limestone | ----- | 2 |
| Steamed bonemeal | ----- | 2 |
| Manganized salt | ----- | 1 |
| Riboflavin supplement (500 micrograms of riboflavin per gram) | ----- | .5 |
| Vitamin A and D feeding oil (2,000 International Units of vitamin A ; 300 International Units of vitamin D) | ----- | .5 |

¹ When this mash is fed, oystershell or limestone should be supplied in hoppers.

Scratch Grain

When a mash-grain ration is fed to layers it is good management to feed scratch grain only once a day, preferably all they will eat

just before they go to roost at night. The quantity of grain to feed will vary according to the air temperature, and the rate of egg production and activity of the fowls, but it is not hard to gage after a little practice.

As a rule, as much or more mash than scratch grain should be fed during the year. The same proportion of grain to mash should be fed during both hot and cool weather; if 60 percent of mash and 40 percent of grain is fed during hot weather, that proportion should also be fed during cool weather.

Although it may be advisable to feed scratch grain in the floor litter in cold weather to induce exercise, it is more sanitary to place it in hoppers. In hot weather the exercise induced by feeding scratch grain in the litter may be harmful instead of beneficial.

A good scratch feed may consist of equal parts of milo or hegari and wheat.

Water

Fresh water should be kept before laying hens at all times. It is essential both for the production of eggs and for the preservation of life. A laying hen may live several days without feed, but on a hot day she may not live many hours if she cannot get water to drink. If layers go without water part of the time during hot weather, egg production will certainly stop even if the hens do not die. An automatic watering system saves labor. During hot weather, water should be placed in a shady spot.

CARE OF MARKET EGGS

Keeping the nesting material and floor litter clean are essential in the production of clean eggs. When open nests are used, the eggs should be gathered frequently. This will help to keep eggs from being broken in the nests, thus lowering the quality of other eggs in the same nest. There will be fewer cracked eggs if plenty of nesting material is kept in the nests.

The chickens must be fed some source of vitamin D, or have access to direct sunshine, in order to produce eggs with strong shells that will not crack readily. Also, some good source of calcium carbonate, such as oystershell or limestone, must be fed. As air temperatures become higher, however, egg shells become thinner and crack more easily, even though the layers receive enough of the materials known to be needed for strong shells. This apparently is caused by the lowered calcium metabolism of the layers, and no remedy has been found for it.

Eggs spoil more quickly at high temperatures than when kept cool. Eggs should be collected several times daily, especially during the hot summer months, and then should be kept in a cool, humid place both before and after they are packed in egg cases or cartons. The containers should be cool when the eggs are packed in them. A refrigerated room is probably the best place to store eggs, if one can afford it. A cooler of the evaporative type is also used by poultrymen for cooling the room in which market eggs are kept.

Fertile eggs spoil more quickly than infertile eggs. Therefore, all male birds should be kept out of the laying flock except during the

breeding season. Blood rings develop in fertile eggs kept at high temperatures, and such eggs are of little market value. Even if fertile eggs are stored in a cool place, they do not keep as well as infertile eggs. Eggs should be marketed frequently, especially during hot weather.

DISEASE PREVENTION

The mortality problem is undoubtedly the chief problem that confronts the poultryman, regardless of his location. Probably more failures occur in the poultry business because of high mortality than for any other reason. The principal reasons for high mortality are diseases and parasites.

Prevention is the only practical method of controlling poultry diseases. Pullorum disease is an example of a fatal disease of young chicks that is easily controlled by prevention. It is prevented in young chicks by blood testing the breeding stock and eliminating fowls that have the disease.

Eggs from infected hens should never be placed in the same incubator with eggs from healthy hens. This practice may spread the disease from infected to noninfected chicks as they hatch. It is also a good plan to disinfect the incubator between hatches.

Fowl pox, more commonly called chicken pox, is an example of a disease for which there is no practical treatment but which can be controlled by vaccination. Fowl pox is so mild in some flocks in the subtropical, semiarid regions of the United States that vaccination as a control measure is not necessary; in other flocks it causes severe economic losses because of mortality and decrease in egg production. Where fowl pox is likely to appear every year with severe consequences, chickens should be vaccinated when they are from 3 to 5 months old.

Strict sanitation is necessary for prevention and control of poultry diseases. Poultry houses and equipment should be cleaned and sprayed frequently. Dropping boards should be cleaned every day when possible. Wire netting should be placed between the roosts and the dropping boards to prevent the chickens from coming in contact with the droppings. Guards should be placed around the water vessels to prevent the chickens from contaminating the drinking water with droppings and other filth.

When the houseless method is used, the roosting platforms should be moved at least once a month, the space under the roosts and equipment shelters should be raked, and the litter should be removed.

Poultrymen who live where crops are irrigated should not allow their chickens to drink irrigation water as it may carry disease germs from ranch to ranch.

PARASITES IN THE SOUTHWEST

When chickens are allowed to range, a system of land rotation helps to control diseases and parasites. It is of special value in the control of roundworms. A 2-year, or perhaps 3-year, rotation system should be followed.

Among other parasites in the subtropical, semiarid regions of the Southwest are the fowl tick, commonly called the blue bug, and the sticktight flea. These parasites frequently are introduced into the flock by the purchase of infested chickens.

Fowl Ticks

The first stage of the fowl tick's development is passed on the body of the fowl. After that stage the ticks leave the bird and, like the much smaller red mite, live in cracks and crevices during the day and feed at night. They are blood suckers and are often fatal to young chicks.

If a chicken house is badly infested with ticks and is of little value, it should be destroyed by burning. If the house is too valuable to burn, it should be sprayed with the wood preservative, anthracene oil, or with crude petroleum. Care should be taken to spray the material into cracks and crevices where the ticks hide. Loose boards and boxes may provide hiding places for the ticks and should be removed from the house before it is sprayed. After the general spraying, anthracene oil should be applied to roosts, roost supports, and nests several times at intervals of 3 to 4 weeks. No good method is known for killing the seed tick on the body of the fowl.

Control of the fowl tick and red mite is facilitated by constructing roosts and nests so that they may be easily examined and treated.

Sticktight Fleas

Sticktight fleas on poultry are usually found in clusters on the comb, wattles, and around the eyes. Dogs, cats, and rats may be infested with sticktight fleas and should be kept away from chickens. As sticktight fleas breed in dust, the chicken yard and other dusty places to which the chickens have access should be sprayed with creosote oil. Carbolated petrolatum or sulfur ointment may be applied to the combs and wattles of the infested fowls. Care should be taken not to get any of the ointment in the chickens' eyes, as it may cause blindness.